



Kodak Professional Notes

NUMBER 3 • 1956

For Registered Owners of:
Kodak Color, Industrial, and Professional Handbooks

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T. M. REG. U. S. PAT. OFF.

KEYS TO COLOR PRINTING Part IV

(Judging Color Negatives)



THERE'S A SAYING around Kodak these days that "we have a tiger by the tail and he is just beginning to wake up." Of course, we mean the method of making color prints with the combination of Kodacolor Film (or Ektacolor Film in sheet sizes) and Kodak Color Print Material, Type C. Thus we think that very soon many photographers will have a new interest in the whys and wherefores of color negatives. But some of these people may well feel lost in judging the quality of their exposures until they become more familiar with the appearance of a normal color negative. So, we hope the following information will be helpful:

WHY THEY ARE ORANGE. The most unusual thing about Kodak's color negatives is that they have an over-all strong orange coloration. This is a built-in feature of this film which greatly improves

the accuracy of color reproduction. This color correction is called "masking," and it is achieved by the use of *colored* dye couplers in two of the three emulsion layers. Through this system, the masking to achieve the increased color fidelity is automatic and requires neither any thought nor special manipulation by the photographer.

If you want to see this masking effect, the exposure must be restricted to one layer only. Photograph a gray scale against a black background with the color negative material by using a red separation filter over the camera lens. This will result in exposing only the red-sensitive layer. Examine the processed negative on an illuminator. Visually, this negative of the gray scale appears as a scale of cyans on an orange background. The black step of the original subject scale appears as orange; the dark steps as a combination of orange and cyan; the

lighter steps as increasingly saturated cyan; and the white end as the most saturated cyan area.

Next examine this same negative through a red separation filter, such as a Kodak Wratten Filter No. 29. The steps of the scale will appear as a *negative* monochromatic scale produced only by the cyan dye.

But now look at the negative through a green separation filter, such as the Kodak Wratten Filter No. 61. The scale will show practically no gradation. The *positive* mask image is canceling the *negative* green light absorption of the cyan image. This effect prevents the cyan negative layer from exposing the magenta print image.

DENSITY. After the color negative has been processed and dried, it is both desirable and easily possible to judge whether the exposure was adequate. Previous experience and "photographic horse sense" will be helpful in this respect. Generally speaking, the same criteria can be used for judging color negatives as are used for black-and-white negatives. The highlights should not be blocked up and there should be sufficient detail in the important shadow areas.

A negative may be examined alternately with a red and a green separation filter to help determine if the exposure was satisfactory. In this case, the filters aid in seeing *through* the mask densities. This is especially useful when you are trying to determine if the exposure in the shadow areas was sufficient. Under these viewing conditions, the shadow areas more closely resemble the shadow areas of an ordinary black-and-white negative.

The *alternate* use of red and green filters was suggested because shadow areas are not necessarily neutral. A

shadow area whose image color is about the same as the viewing filter will *appear* underexposed, whereas the same area viewed through the other filter will show some density proving that this area is not actually underexposed.

Using a blue separation filter to view a color negative is not particularly helpful, since the image appears entirely too dark to make judgment practical.

It may be helpful to make a side-by-side comparison between the color negative and a black-and-white negative of the same subject, if possible, of normal density and contrast. To simulate the orange appearance of the color negative, place an unexposed but processed sheet of Kodacolor or Kodak Ektacolor Film over the black-and-white negative. In addition, a green separation filter can be used to judge or compare the density of both films on the illuminator. There still will be color differences between the two films; the reason for this is that in the color negative the orange mask will be decreased in the areas where either red or green light has exposed the film.

In such areas as a portrait subject's face, it will be easy to compare density differences between color and black-and-white negatives. There is, however, an important exception: A reddish face does not have "full" mask density. Thus, an imageless sheet of color film (having full mask density) plus a green separation filter would make the density of the face in the black-and-white negative higher than that of the color negative.

If you have a Kodak Color Densitometer, Model I, there are more precise checks that can be made on the exposure level of a color negative. Depending somewhat on the nature of the subject, a normally exposed color negative, *when read through the red filter* in the Color Densitometer, should yield approximately the following densities:

Area	Approximate Density*	
	Ektacolor, Type B	Kodacolor, Ektacolor, Type S
The Kodak Neutral Test Card (gray side), when held directly in front of the subject's face.....	0.65	1.0
The value of the lowest step in a Kodak Gray Scale receiving essentially the same illumination as the subject.....	0.3	0.4
The highest diffuse density of a normally lighted forehead.....	1.0-1.2	1.3

*Values obtained by averaging readings from three "good" negatives.

CONTRAST. The normal contrast of a color negative is at a gamma of about .6 to .7. This is achieved by using the recommended time and temperature found in the instruction sheet packed with the negative film processing kit. Attempts to change the development contrast are certain to fail, because of the different development rates of the three emulsion layers. Overdevelopment or underdevelopment will, therefore, produce unmatched gammas with consequent "wild" reproduction of the colors, which are impossible to bring back into balance. Obviously, "forced" development to attempt to increase film speed is *not* feasible.

How, then, is contrast controlled? It's done by controlling lighting ratios when the exposure is made. This is accomplished in the ordinary way, through the proper arrangement of studio lights or with the usual "fill-in" techniques outdoors.

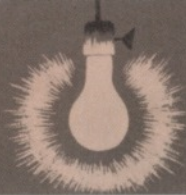
With regard to lighting ratios we're somewhat in the realm of personal preference, but, in general, the lighting ratios should be somewhat less for color printing than for black-and-white work. This is because color differences themselves provide much of the necessary

tonal separation that is achieved in monochrome only by "stiffer" or more contrasty lighting. The practical clue to be gained here is that, if the color negative appears to have as high a lighting ratio as the black-and-white negatives you are accustomed to seeing, the ratio is probably too high and the print may be too contrasty. In other words, if your color negative looks "snappy," watch out!

DEFINITION. Examined visually, a color negative may appear to be lacking in sharpness when such is actually not the case. There are three interesting reasons for this effect:

1. Color negatives are made from low-contrast materials. This means that the general image contrast is low and that the ratio between the light and the dark areas is *less* than it was in the original subject. There is, of course, a less sharp appearance to a low-contrast image than to a high-contrast image of the same subject. Thus, a white picket fence "stands out" less on an overcast day than when it is strongly cross-lighted with brilliant sunshine.
2. Color negatives have, in addition, a low *visual* contrast, because of the overall orange coloration. This means that you will be comparing adjacent areas which are somewhere near the same color, such as brown against orange. Naturally, there is less visual contrast in this situation than when comparing black against white.
3. Finally any dot or line in a color-negative image is actually composed of three superimposed layers in the film's emulsion. The middle layer, which is sensitive to green light and has a magenta dye image after processing, has been found to be the one primarily responsible for the definition or "sharpness." Therefore, to see the negative as it will be "seen"

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How Light is a Darkroom?

WHAT IS "proper" safelight illumination? Most darkrooms need two types:

The general illumination is best provided by the Kodak Utility Safelight Lamp, Model C. These should be installed on the basis of one fixture per one hundred square feet of floor area. They are best suspended from the ceiling, by the chains supplied, with the filter side up so that the light is directed toward a white ceiling and thus indirectly illuminates the whole room.

In those situations where the ceiling is higher than ten feet, or is of such color or construction as to be a poor reflector, the lamp should be mounted filter down to provide direct illumination.

Regardless of whether the direct or indirect lighting method is used, an incandescent bulb of no more than 25 watts is recommended.

Now, for the direct working area illumination, there are three choices in Kodak safelights: the Kodak 2-Way Safelamp, the Kodak Darkroom Lamp, and the Kodak Adjustable Safelight Lamp. The first two of these are de-

signed to screw directly into a drop-cord, or wall or ceiling socket. The last lamp has its own wall or ceiling mounting bracket, socket and cord which allow the lamp to be swiveled and aimed in any direction. Selection among these should be made on the basis of mounting method and suitability of coverage.

In the direct-illumination safelights, 15-watt bulbs should be used, and they should be mounted *no closer than four feet from the working surface where sensitized materials are to be handled*. A larger bulb or smaller distance entails a serious risk of fogging paper or film handled under the safelight.

Modern processing practices, which include film loading and processing in total darkness, and both projection printing and contact printing under Kodak Safelight Filters, Wratten Series 0A, or equivalent, have caused most darkroom lamps to be equipped only with the Series 0A Filters. However, for photo labs where out-of-the-ordinary materials are handled or where various films may be developed by inspection, other filters

KODAK WRATTEN SAFELIGHT FILTERS

Wratten Series	Color	Use
0A	Greenish Yellow	For contact and enlarging papers except Kodagraph papers
0C	Orange	For contact and enlarging papers, including multi-contrast papers
00	Yellow	For slow-speed contact papers and Flash Exposure with Magenta Contact Screens
1	Red	For blue-sensitive films and plates only, such as Lantern Slide Plates and Kodak Commercial Film. Also for Kodagraph Enlarging Papers
1A	Light Red	For Kodalith materials, Kodagraph Contact Papers, and Flexichrome Film
2	Dark Red	For orthochromatic films and plates
3	Green	For panchromatic films and plates
6B	Amber	For sheet x-ray and dental films. Not recommended for other photographic materials
7	Light Green	For infrared film and plates and Kodak Ektacolor Print Film. Not safe for orthochromatic materials or Kodak High Speed Infrared Film
8	Dark Yellow	For Eastman Color Print Film, Type 5381
10	Dark Amber	For Kodak Color Print Materials, Type C, and Type R

are available. The table at left lists the available standard types along with a description of the sensitized materials for which they are designed.

In professional or industrial photo labs where the safelights commonly operate all day every day, it is a good practice to

conduct safelight safety tests at least once a year. The results will indicate when these filters should be replaced.

For additional details on the method of testing safelight safety, write the Sales Service Division for pamphlet No. K-4, "How Safe is Your Safelight."



THESE DAYS when anyone says "What's new?" there is a wonderful answer. It's that Kodak Hypo Clearing Agent has now been approved for use with papers as well as film. Briefly, Hypo Clearing Agent is a proprietary chemical which functions as a hypo neutralizer and makes possible more rapid and complete washing of fixed sensitized materials to obtain a *higher* degree of stability than can be obtained under normal processing conditions. If you have been using Hypo Clearing Agent with film, you already have an inkling of what this same technique means for print processing.

The big news is really threefold: the use of this bath will not adversely affect the ferrotyping characteristics of glossy papers, the wash-water temperature is no longer critical, and *print washing time has now been reduced from the customary hour to only ten minutes.*

It works like this:

1. First, mix the Hypo Clearing Agent working solution as directed on the package.
2. After normal fixation, transfer the

Operation Short Wash Now for Papers

prints, with or without rinsing, to the Hypo Clearing Bath.

3. Minimum time of treatment, with agitation, at 65° to 70° F: single weight or thinner papers, 2 minutes; double weight papers, 3 minutes. No harm will be caused by longer times of treatment.

4. After treatment, wash single weight or thinner papers at least 10 minutes and double weight papers at least 20 minutes with agitation and normal water flow. The water temperature does not have to be controlled and may be as low as 35° F. However, if washing temperatures are this low, and if the prints are to be toned, two-bath fixation is especially necessary. Be sure to consult the information on special uses of Hypo Clearing Agent found on the carton container.

A maximum exhaustion limit of eighty 8 by 10-inch prints per gallon (or the equivalent in other sizes) has been established when no rinse is used between the fixing bath and the Hypo Clearing Agent bath. When a running water rinse is used, a capacity of two hundred 8 by 10-inch prints is applicable.

New Look IN THE KODAK *Industrial Handbook*

IN ORDER to increase the scope of the *Kodak Industrial Handbook* and bring it up to date on some of the newer practices in industrial photography, it has been revised. Three of the original Data Books have been removed and replaced with three new ones. The three removed are: "Photography Through the Microscope," "How to use Kodagraph Reproduction Materials," and "Microfilming with Kodagraph Microfile Equipment and Materials." These will continue to be available separately as optional Data Books.

The new line-up of basic components in the revised *Industrial Handbook* is: "How to Organize and Operate Photographic Service Departments," which discusses the physical and procedural matters involved in managing photographic facilities, either in-plant or commercial.

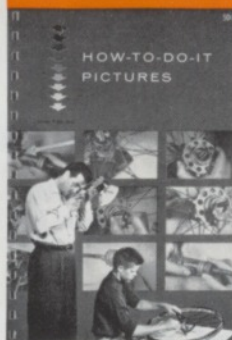
"Photographic Production of Slides and Film Strips," which deals with the materials and methods involved in making these two types of visual aids which are used so widely in sales, training, and technical reporting. Color duplicating is included.

"How-To-Do-It Pictures," which considers the techniques used in making pictures for the purpose of illustrating technical procedures, both for the

professional repairman and/or the home consumer.

"Making Service Pictures for Industry," which describes techniques for the photography of many kinds and sizes of industrial subjects. In addition to printed separators for each of the above Data Books, two other separators with tabs printed, respectively, "Microscope" and "Photocopies" are supplied in the binder for use by those photographers who already have the books in these fields or who wish to purchase them from their Kodak dealer. Two separators with blank tabs are also included for use with other articles, technical notes, or Data Books which the owner may wish to file for ready reference. The entire group of extra separators can be turned over (bottom to top) if four blank tabs are desired.

Present owners of the *Industrial Handbook* can bring their volume up to date by purchasing the three new Data Books from their dealer. To those who have been putting off adding this handbook to their collection, now is the time!



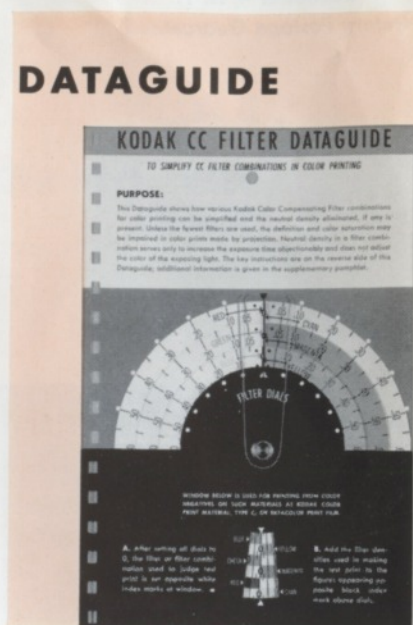
NEWSGRAM

Major revision Kodak Color Films Data Book now available at your dealer's. New edition replaces all previous printings. New facts, figures, illustrations. More about it next issue Kodak Professional Notes.

NEW KODAK *CC* FILTER DATAGUIDE

THE OTHER DAY we received a letter from a photographer who said he was ready to have a try at Type C printing until he read our *Professional Notes* article on Kodak CC Filters, which "lost" him! But NOW, in the new Kodak CC Filter Dataguide, we have the answer for this fellow. This Dataguide has three dials which show how various CC Filter combinations for color printing can be simplified and the neutral density eliminated. Instructions, plus the fundamentals of CC filtering, are included in a 12-page, illustrated booklet which accompanies the Dataguide. Price is \$2.00 at your dealers.

P.S. We never said that color printing was easy, but this makes it a lot easier!



Judging Color Negatives

(Continued from page 3)

by Kodak Color Print Material, Type C, it is necessary to isolate the magenta layer by viewing the negative through a green separation filter.

Of course, we do not mean to neglect the obvious fact that color negatives should be as sharp as possible from a camera-movement and focusing standpoint. Use of a tripod, cable release, depth of field tables, optimum-definition lens apertures, and appropriate shutter speeds are all important factors in producing satisfactorily sharp color negatives.

COLOR RENDITION. It is quite difficult to obtain an accurate judgment by visual examination either of individual colors or of general color balance from a color negative.

This, as may be realized, is because the more pastel and unsaturated colors are partially obscured in an ordinary visual examination by the orange mask. Saturated hues are distinguishable, i.e., bright yellow is reproduced as blue-purple, bright red as cyan, etc., but it is almost impossible to ascertain exactly how pastel shades, cool colors, and the neutrals will be rendered in the print. The colors of the negative image are not only complementary but are also tinted by the yellow and red positive mask layers. However, there is no necessity to judge color balance at this point. The relationships between the three negative layers may vary slightly from one subject or processing to another and still be of no practical consequence. The reason for this is that these relationships are all readjusted anyway when the negatives are printed.

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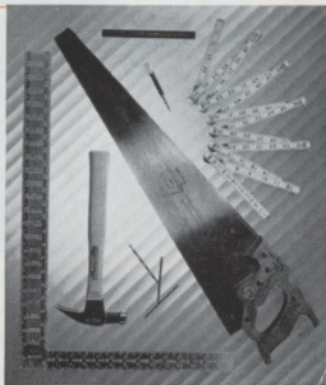
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Pressure-Sensitive Tape

Photography by Rick Warner,
Kodak Professional Studio

TAKE A GOOD LOOK at the accompanying hardware illustration. How was it shot? Here's a clue: negative size was 8 by 10.

Let's see—the objects were laid out on the wavy glass, with the camera shooting downward and the glass illuminated from underneath. Wait a minute—an 8 by 10-inch negative? Including that much subject area means at least a 12-inch lens with a camera-to-subject distance of *at least* 5 feet. Besides, there has to be room for the lights behind the glass. Whoa! Who has a studio with ceilings that high as well as a tripod that will go up like that? That settles it—

it wasn't a vertical shot after all.

As one mystery often leads to another, the question now is this: With the glass standing on one edge and with the back-light *behind* it so that the camera could shoot horizontally, how did the photographer get the tools to remain in place? And the sticky answer, as you rightly surmised from this article's title, is with pressure-sensitive tape.

Although this is a non-Kodak product, available from artists' or stationery supply stores, we are bringing it to your attention because someday it may help to solve a similar problem in your own studio. With adhesive on both sides, several strips of this 1-inch-wide tape can work together to hold an object as heavy as a saw or a hammer onto a vertical sheet of glass. Even the nails were secured in place with small strips cut to size and positioned on the back of each nail where they would be hidden from the camera's view.

Incidentally, this setup was made and shot one afternoon; the next morning, when the photographer came in to dismantle the set, all of the objects were still hanging in place!

Sales Service Division

EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.